

What is claimed is:

1. A rotary machine comprising:

5 a case having an exterior surface, a drive end, an opposite end, and an interior working chamber;

a rotary shaft supported for rotation within the working chamber between the drive end and the opposite end;

10 at least one machine component supported on the rotary shaft for rotation in the working chamber;

at least one air inlet and at least one air outlet formed in the case;

a first fan supported for rotation on the rotary shaft within the working chamber and arranged for moving air through the working chamber from the at least one air inlet over the at least one machine component to the at least one air outlet;

15 a cowl received over the case opposite end and defining a plenum between an interior surface of the cowl and the case opposite end, the cowl defining an annular exhaust opening around a perimeter of the cowl and facing the case exterior surface; and

20 a second fan positioned within the plenum and mounted for rotation on a portion of the rotary shaft, the second fan being arranged for assisting the first fan in moving air through the working chamber and for moving at least a portion of air within the plenum through the exhaust opening and over the case exterior surface.

25 2. A rotary machine according to claim 1, wherein the second fan is supported for rotation on a portion of the rotary shaft extending from the case.

3. A rotary machine according to claim 1, further comprising:

30 a gap between an inner surface of the case and the at least one machine component permitting air to flow through the working chamber between the case and the machine component.

4. A rotary machine according to claim 1, further comprising:
a plurality of longitudinal openings provided in portions of the at least one
machine component permitting air to flow through the at least one machine
component during operation.

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5. A rotary machine according to claim 1, wherein the at least one
machine component includes a rotor section and a stator section of an electric motor
with the rotor section concentrically carried on the rotary shaft for rotation relative
to the stator section.

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6. A rotary machine according to claim 1, wherein the cowl further
includes at least one air inlet port formed concentric with the rotary shaft for
admitting additional air into the plenum, a portion of which is directed over the
exterior surface of the case.

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7. A rotary machine according to claim 1, wherein the at least one air
inlet is provided through the drive end of the case.

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8. A rotary machine according to claim 1, wherein the at least one air
inlet is provided through the case near the drive end.

9. A rotary machine according to claim 1, wherein the at least one air
outlet is provided through the opposite end of the case.

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10. A rotary machine according to claim 1, wherein the at least one air
outlet is provided through the case near the opposite end.

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11. A rotary machine according to claim 1, further comprising at least
one housing extension defining a cavity in communication with the interior working
chamber of the case, the cavity having at least one air inlet port and at least one air
outlet port defining a longitudinal air flow path through the cavity.

12. A rotary machine according to claim 1, wherein the first fan is arranged for moving air from the drive end toward the opposite end of the case and wherein the second fan moves air exiting the at least one air outlet toward the exhaust opening of the plenum.

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13. A rotary machine according to claim 1, wherein the first fan is arranged for moving air from the opposite end toward the drive end of the case.

14. A rotary machine according to claim 1, further comprising:

10 a baffle plate positioned between the at least one air inlet and the first fan, the baffle plate having one or more air openings formed therethrough and being arranged to assist in distributing air over the interior working chamber near the at least one air inlet.

15. A rotary machine according to claim 1, further comprising:

15 an inlet chamber in communication with the at least one air inlet, the inlet chamber positioned near the first fan; and

20 a plurality of air passages provided in a wall of the inlet chamber facing the first fan arranged to assist in distributing air over the interior working chamber near the first fan.

16. A rotary machine according to claim 1, further comprising:

25 at least one supplemental air outlet positioned upstream of the at least one air outlet for permitting a portion of the air moving through the interior working chamber to exit the case prior to reaching the at least one air outlet.

17. A rotary machine according to claim 1, further comprising a plurality of air inlets.

30 18. A rotary machine according to claim 1, further comprising a plurality of air outlets.